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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/735,370	12/12/2003	John Frederick Ackerman	130013/11921 (21635-0116)	1818
31450	7590	04/01/2005	EXAMINER	
MCNEES WALLACE & NURICK LLC			BAREFORD, KATHERINE A	
100 PINE STREET			ART UNIT	
P.O. BOX 1166			PAPER NUMBER	
HARRISBURG, PA 17108-1166			1762	

DATE MAILED: 04/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/735,370

Applicant(s)

ACKERMAN ET AL.

Examiner

Katherine A. Bareford

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>12/03</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 9 and 12-17 are rejected under 35 U.S.C. 102(b) as being anticipated by Subramanian et al (US 6296945).

Claim 9: Subramanian teaches a method for preparing a protected article. Column 2, lines 20-40. A nickel base superalloy article that is a component in a gas turbine engine is provided. Column 3, lines 50-68. A bond coat is deposited on an exposed surface of the article. Column 4, lines 5-20 and figure 2. A thermal barrier coating is provided on an exposed surface of the bond coat. Figure 2 and column 4, lines 50-65. To form the barrier coating, first a yttria stabilized zirconia primary ceramic coating is applied onto the exposed surface on the bond coat. Column 2, lines 25-45. Then a cerium oxide precursor compound can be infiltrated into the primary ceramic coating. Column 2, lines 25-45, column 5, lines 30-65 and figures 2-3 (note component C can be Ce). The ceramic oxide precursor compound is heated to form cerium oxide adjacent the exposed surface of the primary ceramic coating. Column 2, line 65 through column 3, line 10 and column 5, lines 40-50 (a cerium oxide material is provided along with an oxide of the primary ceramic).

Claim 12: the precursor can form cerium oxide with the cerium in the +4 valence state upon heating. Column 2, line 65 through column 3, line 10 and column 5, lines 40-50 (as CeO₂ materials can be provided).

Claim 13: Subramanian teaches a method for preparing a protected article. Column 2, lines 20-40. The article is provided. Column 3, lines 50-68. A bond coat is deposited onto an exposed surface of the article. Column 4, lines 5-20 and figure 2. A thermal barrier coating is formed on an exposed surface of the bond coat. Column 4, lines 50-65 and figure 2. To form the thermal barrier coating, first a primary ceramic coating is applied to an exposed surface of the bond coat. Column 2, lines 25-45. Then a sintering inhibiting material is applied to the surface of the primary ceramic coating. Column 2, lines 25-45, column 5, lines 30-65 and figures 2-3. The sintering inhibiting region can comprise cerium oxide in a concentration greater than a general cerium oxide concentration in the primary ceramic coating. Column 2, line 65 through column 3, line 10 and column 5, lines 30-50 (a cerium oxide material can be provided as component C and C is preferably not an A or B material of the primary ceramic).

Claim 14: the article is a nickel base superalloy article. Column 3, lines 50-68.

Claim 15: the article is in the form of a component for a gas turbine engine. Column 3, lines 50-68.

Claim 16: the step of depositing the bond coat includes depositing an aluminum containing overlay bond coat. Column 4, lines 5-20.

Claim 17: the primary ceramic coating can be yttria stabilized zirconia. Column 2, lines 40-50.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1-5 and 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Subramanian (US 6296945).

Claim 1: Subramanian teaches a method for preparing a protected article. Column 2, lines 20-40. The article is provided. Column 3, lines 50-68. A bond coat is deposited onto an exposed surface of the article. Column 4, lines 5-20 and figure 2. A thermal barrier coating is formed on an exposed surface of the bond coat. Column 4, lines 50-65 and figure 2. To form the thermal barrier coating, first a primary ceramic coating is applied to an exposed surface of the bond coat. Column 2, lines 25-45. Then a cerium oxide precursor compound can be applied to the surface of the primary ceramic coating. Column 2, lines 25-45, column 5, lines 30-65 and figures 2-3 (a cerium oxide material can be applied as component C). The cerium oxide

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compound can be heated to form a cerium oxide adjacent to the exposed surface of the primary ceramic coating. Column 2, line 65 through column 3, line 10 and column 5, lines 40-50 (a cerium oxide material is provided along with an oxide of the primary ceramic).

Claim 2: the article is a nickel base superalloy article. Column 3, lines 50-68.

Claim 3: the article is in the form of a component for a gas turbine engine. Column 3, lines 50-68.

Claim 4: the step of depositing the bond coat includes depositing an aluminum containing overlay bond coat. Column 4, lines 5-20.

Claim 5: the primary ceramic coating can be yttria stabilized zirconia. Column 2, lines 40-50.

Claim 7: the ceramic oxide precursor can be infiltrated into the exposed surface of the primary ceramic coating. Figures 2-3 and column 2, line 60 through column 3, line 10.

Claim 8: the precursor can be heated to form cerium oxide with the cerium in the +4 valence state. Column 2, line 65 through column 3, line 10 and column 5, lines 40-50 (as CeO_2 materials can be provided).

Subramanian teaches all the features of these claims except that the heating to form cerium oxide is in an oxygen containing atmosphere.

However, Subramanian does teach that the heating can be done when the component is in service. Column 3, lines 1-10.

It is the Examiner's position that gas turbine engines and their components are commonly run in air, such as when used as an aircraft engine. If applicant disagrees, he should so state on the record.

As a result, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Subramanian to perform the heating in an oxygen containing atmosphere with an expectation of providing a desirably reacted material, because Subramanian teaches that the heating can be done while the component is in service, and it is well known that gas turbine engines are run in air, which would include oxygen, which would contact the surface of the component.

6. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Subramanian as applied to claims 9 and 12-17 above, and further in view of Taylor et al (US 5520516).

Subramanian teaches all the features of these claims except that the primary ceramic coating of yttria stabilized zirconia having about 7 percent yttria by weight.

However, Taylor teaches applying a yttria stabilized zirconia coat onto a bond coating on a gas turbine engine component. Column 5, lines 20-40. The zirconia coat is desirably 7 percent yttria by weight. Column 5, lines 20-40.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Subramanian to use yttria stabilized zirconia with 7 percent yttria by weight as the primary ceramic as suggested by Taylor to provide a desirable coating system, because Subramanian teaches that yttria stabilized zirconia can be used on turbine components when

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forming thermal barrier coatings, and Taylor teaches that a desirable percentage of yttria in zirconia when coating yttria stabilized zirconia on turbine components is 7 percent by weight.

7. Claims 6 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Subramanian as applied to claims 9 and 12-17 and also claims 1-7 and 7-8 above, and further in view of Ueda et al (US 5697992).

Subramanian teaches all the features of these claims except that the precursor compound is $(\text{NH}_4)\text{Ce}(\text{SO}_4)_3$ (ammonium cerium sulfate).

However, Ueda teaches that a well known cerium compound that converts to cerium oxide by calcining is ammonium cerium sulfate. See column 4, lines 20-30.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Subramanian to apply the cerium precursor to the primary ceramic in the form of ammonium cerium sulfate and then heat to form the cerium oxide that reacts with the primary ceramic as suggested by Ueda to provide a desirable coating system, because Subramanian teaches to infiltrate the precursor material, and that the substrate can be heated during and after coating (column 5, lines 40-50 and column 3, lines 1-10) and can be applied as a liquid (column 4, lines 60-68, the sol-gel method), thus indicating that liquid precursor can be applied and heated to form the cerium oxide material that reacts, and Ueda teaches that it is known to apply a precursor compound of cerium oxide to a surface in the form of a liquid containing ammonium cerium sulfate and then heating/calcining to form cerium oxide.

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Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katherine A. Bareford whose telephone number is (571) 272-1413. The examiner can normally be reached on M-F(6:00-3:30) with the First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9306 for regular communications and for After Final communications.

Other inquiries can be directed to the Tech Center 1700 telephone number at (571) 272-1700.

Furthermore, information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


KATHERINE BAREFORD
PRIMARY EXAMINER